How do physical therapists treat people with knee osteoarthritis and what drives their clinical decisions? A population-based cross-sectional survey.

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ABSTRACT

Background: It is unclear how physical therapists (PTs) in Florida (USA) currently treat people with knee osteoarthritis, and whether current best evidence is used for clinical decision making.

Methods: We included PTs from Florida. We assessed perceived effectiveness and actual use of physical therapy interventions and quantified the association between the actual use of interventions with different characteristics of PTs.

Results: 413 PTs completed the survey. Most respondents perceive therapeutic exercise (94%) and education (93%) as "effective" or "very effective". Interventions least perceived as "effective" or "very effective" were electrotherapy (28%), wedged-insole (20%), and ultrasound (19%). PTs that follow principles of evidence-based practice are more likely to use therapeutic exercise (OR3.89;95%CI1.21-12.54) and education (OR3.63;95%CI1.40-9.43), and less likely to use ultrasound (OR0.32; 95%CI0.16-0.63) and electrotherapy (OR0.32;95%CI0.17-0.58). They also indicate that older PTs are more likely to use ultrasound (OR3.57;95%CI1.60-7.96), electrotherapy (OR2.53;95%CI1.17-5.47), Kinesio tape (OR3.82;95%CI1.59-9.18), and ice (OR1.95,95%CI1.02-3.73).

Conclusions: In line with clinical guidelines, most PTs use therapeutic exercise and education in the treatment of people with knee osteoarthritis. However, interventions that lack scientific support, such as electrotherapy and ultrasound, are still used. A modifiable therapist characteristic, adherence to evidence based practice, is positively associated with the use of interventions supported by scientific evidence.

INTRODUCTION

Osteoarthritis is the most common joint disease and the main cause of pain in the elderly.[1] The knee is the most commonly affected joint in the lower extremities, and knee osteoarthritis is strongly associated with physical disability.[1-3] As life expectancy increases, the prevalence of knee osteoarthritis is also expected to increase.[4] Management of knee osteoarthritis is mainly symptom-oriented because there is still no effective disease-modifying treatment.[5]

Physical therapy plays an important role in the treatment of knee osteoarthritis symptoms.[6] Current evidence from randomized controlled trials suggests that the most effective individual physical therapy treatment modalities for knee osteoarthritis are cardiovascular or strengthening exercise and education (i.e. instructions on physical exercises and weight loss).[7-10] However, in clinical practice physical therapists most often use a combination of two or more interventions when treating people with knee osteoarthritis.[11] For example, the use of exercises may be preceded by the use of physical agents such as ultrasound, diathermy or electro analgesia (i.e. Interferential current or transcutaneous electrical stimulation –TENS).

The low representativeness in randomized controlled trials of treatment strategies commonly used in the clinical setting may pose a challenge to evidence based practice.[11] Therefore, we need to know how physical therapists actually treat people with knee osteoarthritis to design representative trials and to identify gaps between evidence and practice to understand where changes in physical therapy education are needed. Although previous studies were conducted in the United Kingdom[12,13], it is unclear how physical therapists in Florida (USA) currently treat people with knee osteoarthritis, and whether current best evidence is used in their clinical decision making.

The purpose of this study was to conduct a survey to understand how physical therapists treat people with knee osteoarthritis, and what drives their clinical decision making.

METHODS

Study design

This population-based cross-sectional electronic survey study was approved by the Florida International University Institutional Review Board (IRB-14-0381).

Target population

The survey was conducted in February 2015 with licensed physical therapists in Florida. No further restrictions in eligibility were applied. A contact list of physical therapists was obtained from the Florida Department of Health. Physical therapists were contacted by email including an invitation to participate and a link to the online survey.

Data collection

We developed a survey based on information from a literature review, concerning related surveys previously published and guidelines of conservative non-pharmacological knee osteoarthritis treatment, and discussions with experts in the field, including researchers who had previously conducted surveys of physical therapy interventions among physical therapists. We pilot-tested our survey with a convenience sample of 20 Doctor of Physical Therapy students from the Florida International University, who gave feedback on content, form, and time needed to complete the survey. We included suggestions from the participants at this stage in the final version of the survey. After the first pilot group was completed, we made minor modifications to improve flow and clarity. Further pilot testing was thus deemed unnecessary and the survey questions were considered relevant for the objectives of the study. The survey was designed so

that it took a maximum of 10 minutes to complete. A copy of the final survey is provided in Appendix 1.

The survey had 12 items distributed across four sections. The first section gathered information on general demographic characteristics and general clinical experience as well as clinical expertise specific to osteoarthritis management: gender, age, years of practice, currently practicing, number of people with knee osteoarthritis seen per month, post-graduate training related to osteoarthritis treatment, and familiarity with guidelines of clinical practice for knee osteoarthritis treatment. The second section assessed perceived effectiveness of the following interventions for the treatment of knee osteoarthritis: manual therapy, therapeutic exercise, aquatic exercise, electrotherapy, ultrasound, ice, heat, wedge insoles, knee brace, Kinesio tape, education, and rest. Perceived effectiveness was assessed in a Likert-type scale with the following options: ineffective, somewhat effective, effective, very effective. Because different physical therapists may have different perspectives on what constitutes an effective treatment, we presented in our survey a case vignette of a patient with painful osteoarthritis and consequent functional limitations (Appendix 1), which are considered major outcomes when assessing the effectiveness of knee osteoarthritis treatments.[14] We asked physical therapists to assess the expected effectiveness of different physical therapy interventions taking this case vignette into consideration. The third section concerned the frequency of actual use by physical therapists of each of the interventions listed above to treat people with knee osteoarthritis. Frequency of actual use of interventions was assessed in a Likert-type scale with the following options: never, rarely, sometimes, often. The fourth section assessed whether physical therapists use principles of evidence-based practice to define treatment strategies. Evidence-based practice was defined as the combined use of clinical experience, patient preference, and evidence from peer-reviewed articles as the main sources of information used to define treatment strategies.

We distributed the survey electronically using Qualtrics (http://www.qualtrics.com). The survey website outlined the research project, identified the research team, discussed the privacy of the data, offered a contact email/phone number should potential participants have questions, and other information recommended by the ethics committee. Submission of a completed survey was considered consent to participate.

Data analysis

We tabulated data on demographics and clinical expertise to describe our study population, using percentages, means, and standard deviations as appropriate and plotted results to compare perceived effectiveness with actual use of physical therapy interventions. We conducted multivariable logistic regression models to derive odds ratios with 95% confidence intervals to quantify the association between the actual use of physical therapy interventions, our dependent variable, with different characteristics of physical therapists, our independent variables. Odds ratios above 1 imply that physical therapists with the characteristic of interest are more likely to use a specific intervention. We conducted multiple imputation to account for missing answers by using gender, age, years of clinical practice, number of patients treated with knee osteoarthritis per month, post-graduate training related to osteoarthritis treatment, and evidence-based practice as variables in the imputation model, to create 20 imputed datasets.[3,15] The alpha level was set at 0.05. We performed all analyses using Stata 14 (StataCorp LP, College Station, TX) statistical software.

RESULTS

General Population Demographics

Of the 13296 invitations sent by e-mail, a total of 413 physical therapists completed the survey and were included in our analysis (3.1% of response). Table 1 displays the characteristics of the physical therapists that answered the survey. Respondents were on average 44 years old, mainly females (64%), with over 10 years of clinical practice (66%), and who defined treatment strategies following principles of evidence-based practice (69%). Less than 30% saw more than 10 people with knee osteoarthritis per month or had postgraduate training related to osteoarthritis treatment.

Perceived effectiveness and use of PT interventions

Figure 1 displays the percentage of respondents that perceived the effectiveness of interventions as "effective" or "very effective" and percentage of respondents that classified the actual use of the interventions as "often", when treating people with knee osteoarthritis. Most respondents perceive therapeutic exercise (94%) and education (93%) as "effective" or "very effective". Interventions least perceived as "effective" or "very effective" were electrotherapy (28%), wedged insole (20%), and ultrasound (19%). Actual use is in agreement with perceived effectiveness for most interventions, with therapeutic exercise (96%) and education (94%) being used by most respondents, and Kinesio tape (9%), knee brace (8%), and wedged insole (3%) by the least number of respondents. Although aquatic exercise is considered by 88% of respondents as "effective" or "very effective", only 19% reported to actually use this intervention with patients.

Association between physical therapist characteristics and use of knee osteoarthritis treatments

Figure 2 shows the association between physical therapists' characteristics and often use of knee osteoarthritis treatments. Male therapists are more likely to recommend rest (OR 1.84; 95%CI 1.08 to 3.14) and less likely to use Kinesio tape (OR 0.34; 95%CI 0.14 to 0.86). Older physical therapists (>60 years old) are more likely to use ultrasound (OR 3.57; 95%CI 1.60 to 7.96), electrotherapy (OR 2.53; 95%CI 1.17 to 5.47), Kinesio tape (OR 3.82; 95%CI 1.59 to 9.18), and ice (OR: 1.95, 95%CI 1.02 to 3.73). Physical therapists that treat over 10 people with knee osteoarthritis per month are more likely to recommend rest (OR 2.27; 95%CI 1.31 to 3.95) and use ice (OR 2.10; 95%CI 1.32 to 3.34). Physical therapists with postgraduate training related to osteoarthritis treatment are more likely to use manual therapy (OR 1.99; 95%CI 1.25 to 3.18). Physical therapists that follow principles of evidence-based practice are more likely to use therapeutic exercise (OR 3.89; 95%CI 1.21 to 12.54) and education (OR 3.63; 95%CI 1.40 to 9.43), and less likely to use ultrasound (OR 0.32; 95%CI 0.16 to 0.63) and electrotherapy (OR 0.32; 95%CI 0.17 to 0.58). Physical therapists familiar with guidelines of clinical practice for the treatment of people with knee osteoarthritis are more likely to use manual therapy (OR 1.74; 95%CI 1.07 to 2.85).

Combined use of different PT interventions for the treatment of people with knee osteoarthritis

Table 2 shows the frequency of combined use of different interventions for the treatment of people with knee osteoarthritis. The combination of treatments most commonly used is therapeutic exercise, education, and manual therapy (9.75%) followed by the combination of these three therapies plus the addition of ice (6.82%). Given the high heterogeneity of interventions used across different types of combinations, most combinations are used by less

than 1% of physical therapists (61.10%). Only 2.52% of physical therapists reported not using treatment strategies with combined interventions.

DISCUSSION

The results of this survey including 413 physical therapists indicate that the most commonly used physical therapy interventions to treat people with knee osteoarthritis are therapeutic exercise and education, while ultrasound and electrotherapy were among the least used. Our results also indicate that evidence based practice and therapists' age have an important influence on the frequency of how some interventions are prescribed to people with knee osteoarthritis. Unsurprisingly, how physical therapists perceive the effectiveness of interventions was in agreement with the frequency they are used. Aquatic exercise was the main exception, however. While 88% of the physical therapists believe that aquatic exercise is effective or very effective, only 19% reported to often use it with patients, which may be explained by limited access to clinics with appropriate facilities and similar effectiveness to land-based therapeutic exercise.[16,17] Finally, over 99% of the physical therapists reported the combined use of 2 or more interventions, with the combination of therapeutic exercise, education, and manual therapy being the most frequently used.

Two similar surveys were previously conducted with physical therapists from the United Kingdom. In 2006, Holdem et al. [12] conducted a cross-sectional survey with 538 physical therapists randomly sampled from the general population. Similar to our findings, it was reported that physical therapists in the United Kingdom commonly use therapeutic exercises and education to treat people with knee osteoarthritis, and less frequently use Kinesio tape or recommend that patients rest, avoiding physical activities. This is in line with current guidelines of clinical practice.[9,10] However, physical therapists in the United Kingdom made frequent use of

ice, heat, and electrotherapy, which appears to be less frequently used by American physical therapists. There is little evidence supporting the effectiveness of these interventions,[18-20] which consequently leads to weaker recommendations regarding their use.[9] The differences may be due to the time that the study was conducted (almost ten years ago) because practice is always evolving and new evidence is incorporated into practice overtime. Walsh et al. [13] published in 2008 another cross-sectional survey with 83 managers of physical therapy clinics also from the United Kingdom. They reported that therapeutic exercise is the most commonly used treatment in people with knee osteoarthritis, and in agreement with Holdem et al., they also reported that United Kingdom physical therapists commonly use electrotherapy.

Our survey is the first to investigate the association between characteristics of physical therapists and their clinical decision making in knee osteoarthritis treatment. Adherence to principles of evidence based practice and therapists' age seem to be the strongest drivers of clinical decision making. Physical therapists that adhere to principles of evidence based practice are more likely to use therapeutic exercise and education, and less likely to use ultrasound and electrotherapy. Indeed, evidence indicates that the former interventions are effective when treating these patients, and that there is not enough evidence supporting the use of the latter interventions.[7,8,18,19] This is reflected by recommendations presented in recently published guidelines of clinical practice to treat knee osteoarthritis.[9,10,21,22]

Our results also indicate that older physical therapists are more likely to use ultrasound, electrotherapy, Kinesio tape, and ice, which are therapies that are not supported by the evidence, as previously mentioned. This finding may be explained by a number of factors. Perhaps there is a lower interest or lack of skills of older therapists to incorporate new evidence in their practice

or because older physical therapists are less exposed to new and up-to-date knowledge than younger therapists. [23,24]

This is the first study to describe how a sample of American physical therapists treat people with knee osteoarthritis. This is also the first study to investigate the influence of physical therapist characteristics on knee osteoarthritis treatment clinical decision making. It is a population-based survey with a relatively large sample size, including 413 participants sampled from the general population of physical therapists in Florida. Because of the economy of the method used to recruit participants, it was possible to contact all potential participants rather than a sample. One of the main limitations of our survey is that it included only physical therapists from Florida. While we are not aware of evidence that physical therapist skills vary across the US, our results may arguably be limited to Florida physical therapists. Another main limitation is the method used for sampling physical therapists. It is unclear whether the contact information available through the Florida Department of Health is current, which may justify the extremely low response rate of 3%. It is likely that physical therapists interested in osteoarthritis and on evidence based practice participated disproportionately. However, a comparison between PTs who participated in our survey and PTs who are members of the Florida Physical Therapy Association (FPTA) indicate that our sample may be representative of PTs in Florida. FPTA PTs are on average 45 years old, 36% are males, and 59% has over 10 years of clinical practice (personal communication, 16th February 2016). PTs included in our survey are on average 44 years old, 36% are males, and 66% has over 10 years of clinical practice. Moreover, we asked PTs about electrotherapy use, which may lack specificity, as several interventions could be categorized as electrotherapy. Finally, the parametrization of frequency of use may have led to a random error between ‘sometimes’ and ‘rarely’ frequencies of use. However, we believe that if a random error took place, it would have little influence in the results presented in Figure 1.

Our results suggest that incorporation of principles of evidence based practice by physical therapists may lead to clinical decision making supported by the best evidence available when treating people with knee osteoarthritis. It is currently unclear what evidence based practice training method would be most effective for physical therapists to engage in the use of best evidence. Some preliminary work has found that small group work with interactive and personal education tend to be most effective.[25-27] Future studies, ideally using a randomized controlled design, should be conducted to identify which training methods are likely to result in improved clinical decisions based on best available evidence by physical therapists of different ages and professional stages, and eventually its influence on patients' outcomes. Our results also stress that current research of physical therapy treatment for knee osteoarthritis does not reflect clinical practice. While most trials investigate the effectiveness of single interventions, our results indicate that less than 1% of therapists use single interventions when treating people with osteoarthritis. This substantiates the need for randomized controlled trials with factorial designs to investigate the combined effect of complex physical therapy interventions, which are postulated to be larger than the effect of single interventions.[28]

Physical therapists in Florida mainly use therapeutic exercise and education in the treatment of people with knee osteoarthritis, which is in line with best evidence available and current guidelines of clinical practice. Although less frequently used, interventions that lack scientific support, such as electrotherapy and ultrasound, are still used. Use of such interventions may lead to unnecessarily long treatment sessions, wasting financial resources and possibly compromising compliance of patients.[29] A modifiable therapist characteristic, adherence to evidence based practice, is positively associated with the use of interventions supported by scientific evidence. Finally, because over 99% of physical therapists reported the use of complex treatment

277 interventions, future trials should address the heterogeneous nature of physical therapy treatment
278 of people with knee osteoarthritis.

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TABLES

Table 1. Characteristics of Physical Therapists included in the survey

Characteristics of physical therapists	n=(413)
Age, mean (SD)	43.8 (11.8)
Male, n (%)	150.0 (36.3)
>10 years of practice, n (%)	271.0 (65.6)
>10 patients per month, n (%)	121.0 (29.3)
Postgraduate training, n (%)	118.0 (28.6)
Evidence based practice, n (%)	286.0 (69.2)
Familiar with GCP, n (%)	317.0 (76.8)

SD: standard deviation; GCP: Guidelines of clinical practice

Table 2. Frequency of combined use of different interventions for the treatment of people with knee osteoarthritis.

Therapeutic exercise	Education	Manual therapy	Ice	Heat	Electrotherapy	Aquatic exercise	Kinesio tape	Rest	Ultrasound	Knee brace	Wedged insole	Frequency (%)
•	•	•										9.75
•	•	•	•									6.82
•	•	•	•	•								2.69
•	•	•		•								2.20
•		•										2.00
•	•											1.96
•	•	•		•	•							1.95
•	•	•				•						1.95
•	•	•		•	•							1.69
•	•	•					•					1.48
•	•	•	•		•							1.47
•	•					•						1.21
•	•	•	•				•					1.21

61.10% of all combinations of interventions were used by less than 1% of physical therapists; 2.52% of physical therapists use a single intervention for osteoarthritis treatment.

FIGURES

Figure 1. Percentage of respondents that perceived effectiveness of knee osteoarthritis treatments as “effective” or “very effective” and percentage of respondents that classified actual use of treatments as “often”.

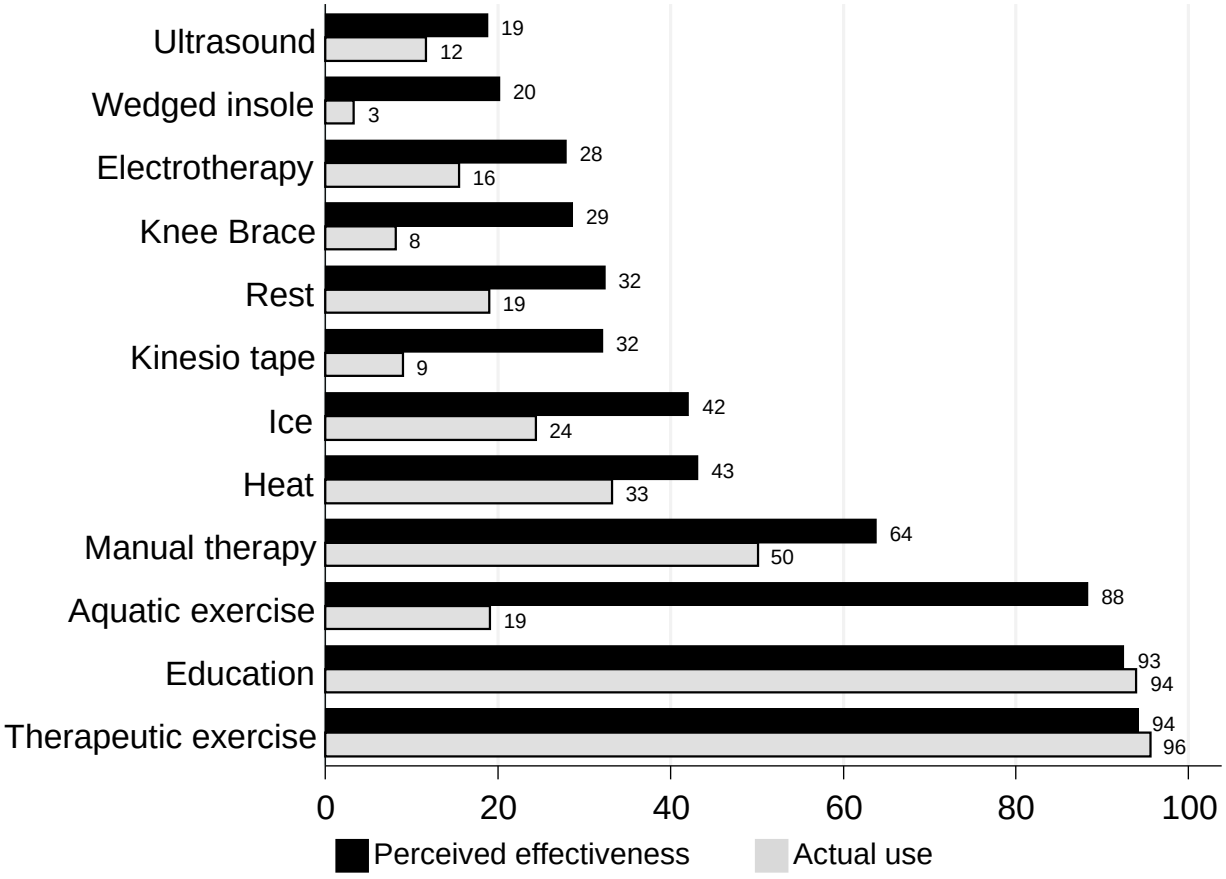
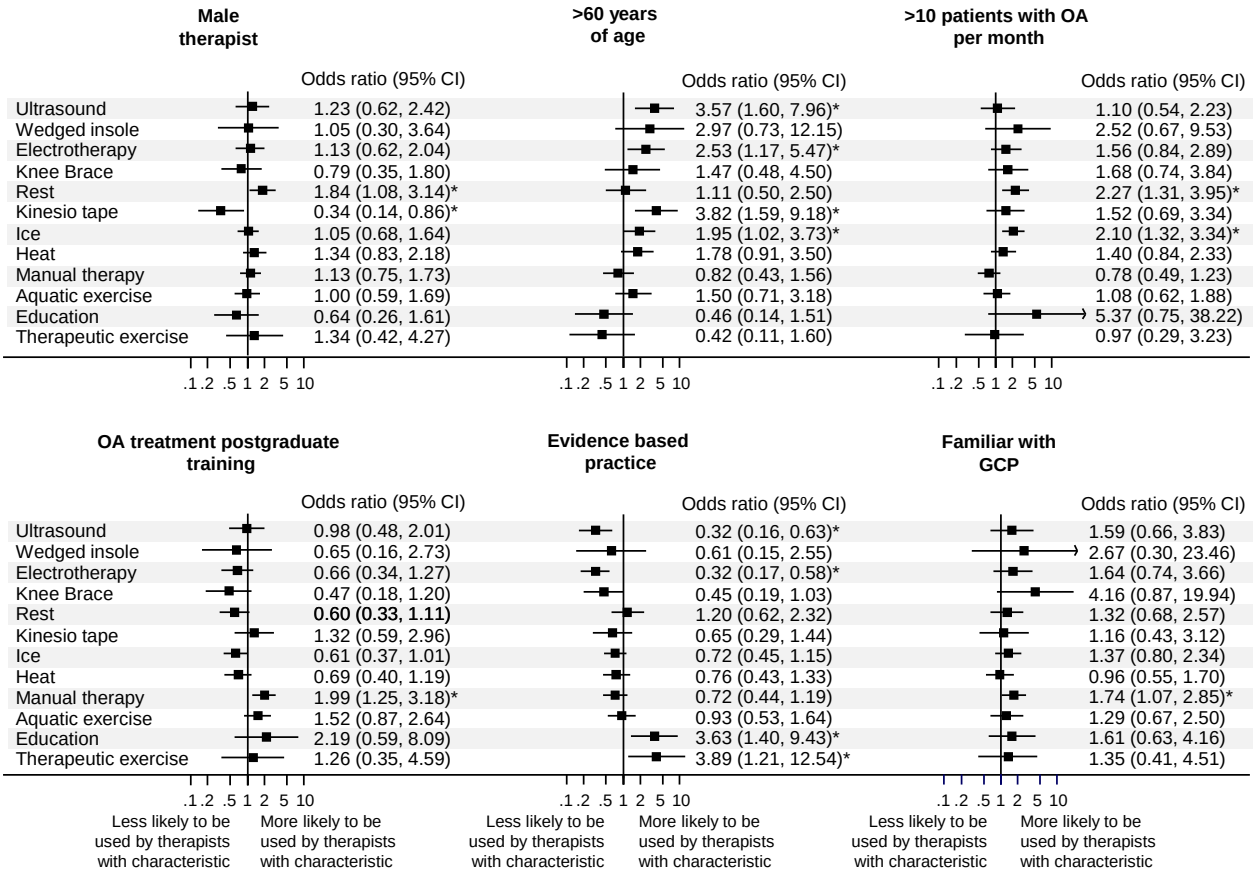


Figure 2. Association between physical therapist characteristics and frequent use of knee osteoarthritis treatments.



OA: osteoarthritis; GCP: guidelines of clinical practice; CI: confidence interval. *statistically significant at $p<0.05$. Estimates are derived from multivariable models with frequency of use of knee osteoarthritis treatments as a dependent variable and physical therapist characteristics as independent variables.

APPENDIX

Appendix 1. Survey conducted in Qualtrics (http://www.qualtrics.com)

Intro Thank you for taking this short survey. Please try to answer all questions, regardless of how frequent you treat patients with knee osteoarthritis. The survey has a total of 12 questions and should take approximately 5 minutes to be completed.

Q1 What is your gender?

- ❍ Female
- ❍ Male

Q2 How old are you?

Q3 What year did you become licensed to practice physical therapy?

Q4 How many years have you practiced as a physical therapist?

- ❍ 0
- ❍ 1-5
- ❍ 6-10
- ❍ 11-15
- ❍ 16-20
- ❍ >20

Q5 Do you currently practice as a physical therapist?

- ❍ Yes
- ❍ No

Q6 Approximately, how many patients with knee osteoarthritis do you treat per month?

- ❍ 0
- ❍ 1-5
- ❍ 6-10
- ❍ >10

Q7 Do you have any specific post-graduate training related to osteoarthritis treatment?

- ❍ Yes
- ❍ No

Q8 Please use the following case scenario to answer question 8. A 65 year old patient with knee osteoarthritis has moderate pain (4/10 on visual analog scale) causing moderate limitations of ADLs. The patient has no contraindications for physical therapy interventions and has good cognitive function. In your opinion how effective would the following interventions be to treat this patient?

	Ineffective	Somewhat Effective	Effective	Very Effective
Manual Therapy	❍	❍	❍	❍
Therapeutic Exercise	❍	❍	❍	❍
Aquatic Exercise	❍	❍	❍	❍
Electrotherapy/E-Stim	❍	❍	❍	❍
Ultrasound	❍	❍	❍	❍
Ice	❍	❍	❍	❍
Heat	❍	❍	❍	❍
Wedge Insoles	❍	❍	❍	❍
Knee Brace/Wrap	❍	❍	❍	❍
Kinesio Tape	❍	❍	❍	❍
Education	❍	❍	❍	❍
Rest	❍	❍	❍	❍

Q9 How often do you use the interventions below to treat patients with knee osteoarthritis?

	Never	Rarely	Sometimes	Often
Manual Therapy	❍	❍	❍	❍
Therapeutic Exercise	❍	❍	❍	❍
Aquatic Exercise	❍	❍	❍	❍
Electrotherapy/E-Stim	❍	❍	❍	❍
Ultrasound	❍	❍	❍	❍
Ice	❍	❍	❍	❍
Heat	❍	❍	❍	❍
Wedge Insoles	❍	❍	❍	❍
Knee Brace/Wrap	❍	❍	❍	❍
Kinesio Tape	❍	❍	❍	❍
Education	❍	❍	❍	❍
Rest	❍	❍	❍	❍

Q10 What combination of interventions do you commonly use to treat patients with knee osteoarthritis?

- ❑ Manual Therapy
- ❑ Therapeutic Exercise
- ❑ Aquatic Exercise
- ❑ Electrotherapy/E-Stim
- ❑ Ultrasound
- ❑ Ice
- ❑ Heat
- ❑ Wedge Insoles
- ❑ Knee Brace Wrap
- ❑ Kinesio Tape
- ❑ Education
- ❑ Rest
- ❑ I do not combine interventions

Q11 Rank the sources of information used to guide your clinical decision making on knee OA treatment. (Top = Main Source / Bottom = Last Source). Click and drag items to reorganize in order of importance.

_____ Courses I attended
_____ Text books
_____ Peer-reviewed articles
_____ Peer advise
_____ Patient preference
_____ Clinical experience

Q12 Are you aware of clinical practice guidelines that you could use to help your clinical decision making?

- ❍ Yes
- ❍ No